



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

Reviews of Foreign Literature.

In a Dissertation by Paul Hauptfleisch, Greifswald, 1888, on the Cell-membrane and gelatinous Envelope of the Desmids, the author states that with the exception of Spirotaenia, which does not properly belong to the Desmids, the cell-membrane of the entire family consists of two separate pieces, the thin edges of which overlap each other in a similar manner to the membrane pieces of the Diatoms. Many species of Closterium and Penium correspond still more closely to the Diatoms by having the so-called shells and girdle bands of the latter. When the cells divide a new cylindrical membrane is first formed under the place of meeting of the two pieces of the old, and when the two halves are shoved apart, the new membrane is thus exposed, after which a cross portion divides it in two cells. The completed membrane is in most cases provided with small pores; extending through these are fine protoplasmic threads, which terminate on the outside in small head-like expansions. The gelatinous covering of the membrane consists of separate portions covering certain parts, and these portions are composed of prismatic bodies fitting closely into each other.

Although no clear exposition of the functions of these pores, nor of their relation to the rest of the plant, is given by the author, he states emphatically that the exudation of gelatinous substance takes place through them and that they are not formed till the membrane is otherwise perfect.

E. L. G.

The so-called Spermatia of the Ascomycetes. By Alfred Moeller. (Bot. Zeitung, July 6th, 1888.)

This is the subject of a brief article in reference to certain criticisms on a previous article, "The Culture of Lichen building Ascomycetes without Algæ," in which the author has given strong evidence in favor of the conidial nature of the supposed spermatia of the ascomycetes. In the article in the Bot. Zeitung, he sums up the evidence in favor of the theory of the sexual nature of the spermatia, and then the evidence on the other side, and states that there is no longer any reasonable ground for the assumption of the sexual function of these organs.

The arguments for and against this theory are as follows:

When Stahl published his work on "The Sexual Reproduction of the Collemaceæ," no one was able to refute the assumption that the office of the spermatia was that of fertilization. But it is quite as evident that in all the investigations made by Stahl, he was unable to bring forward any direct proof of this assumption. This latter fact was first clearly stated by Brefeld in his work on "Schimmelpilze." Now Moeller states that this last mentioned criticism holds also in reference to the two other cases generally cited in connection with that of the Collemaceæ, viz.: What is given by Fisher and Frank in reference to *Polystigma* and *Gnomonia*. These three instances, he says, are the only ones brought forward by the advocates of the sexual nature of the spermatia of the ascomycetes. Opposed to this view of the subject is a long list of facts which may be briefly stated as follows:

Already in 1876, shortly before the appearance of Stahl's work on the Collemaceæ, Cornu had discovered that in case of several kinds of the spermatia in question, they began to germinate and develop into a mycelium, when offered the proper nourishment. Against this evidence of the conidial nature of the spermatia critics at once decided this to be only an abnormal development of a sexual organ whose real function was turned aside by external causes, and they gave as an analogous case the germination of the pollen grain in a sugar solution.

Next appeared Krabbe's investigations, published both in the Bot. Zeitung and in the Berichte des Deutschen Gesellschaft zu Berlin. These had special reference to the lichens. From this work it appears that the spermatia produced by *Cladonia* cannot be considered sexual organs, because the development of the apothecia is shown to be independent of any participation on the part of the spermatia. To evade this evidence of their non-sexual character, the opponents of this theory had recourse to the assumption of apogamy, this being the only possible explanation left them.

Next, the author speaks of the objections raised as to the results of his own work, although he succeeded in bringing the so-called spermatia, not only to germination, but to thallus-forming

and fruit-bearing, still the believers in the sexual function declare this may be explained on the ground of the prevention of sexual activity. They cite as analogous cases, the swarm spores of *Ectocarpus*. The author says that the facts in reference to these swarm spores are no more relevant to the case in question, the analogy, therefore, no closer, than in the comparison of the spermatia about which Cornu writes, with the pollen grain of the phanerogams. He says the organs are entirely different and the plants to which they belong are very far from sustaining a close relation to each other; what is to be gained, therefore, by comparing the development of a naked, ciliated swarm-spore with the conidia of the ascomycetes which cluster about the twelve celled trichogyne?

As the last and most conclusive evidence against the sexual theory, he gives what is found in the latest edition of Brefeld's "Schimmelpilze," (Heft. vii, p. 57). Here it is claimed that what was formerly looked upon as an unexplainable riddle, viz.: Ascus fruit without the intervention of a sexual act, is clearly the natural course of one method of a sexual reproduction, the highest member of which is the sporangium fruit. As proof of this conclusion Brefeld says that during the winter preceding the publication of his work, more than one hundred forms of spermatia, chosen at random from many kinds of ascomycetes, were brought to germination and development. Added to this were many cases of new forms of spermatia never before tested.

Contrasting the facts for and against the sexual theory, the author says there can no longer be the least doubt existing. In three cases, by a somewhat circuitous method of reasoning, the probability of the sexual nature of the organ was established. In none of these instances was it shown that the spermatia united with the trichogyne. Add to this the improbability of the fertilizing matter of the tiny spermatium being able to make its way, as sometimes it must, through twenty-four trichogyne cells before it can effect fertilization, and the evidence is very much weakened. All the spermatia which have been subjected to careful treatment have shown their ability to germinate and develop. Careful experiments have shown that the ascus fruit can be asexually produced without the aid of the spermatia, and finally it may be

said, it has been clearly proven that the ascus fruit in general originates asexually. Notwithstanding all this the author complains of the exceeding obstinacy of those who still bring forward the old argument and explain by bringing in apogamy and such far-fetched analogies as the swarm-spores of *Ectocarpus*.

For the benefit of those who still hold fast to the one strong point in favor of the sexual theory, viz.: the facts in case of *Collema microphyllum*, he adds a single fact, which is that spermatia of this plant, after lying one month in prepared food solution, began to show signs of germination; after two and three months they had thrown out tiny tubes in two or three directions, and not till after the fourth month did the tubes reach the stage of branching. It is therefore, the opinion of the author that when the various kinds of lichen conidia (spermatia) have been studied so as to allow of their arrangement in a series whose members show a constantly decreasing power of intensity of growth, those of *Collema* will stand at the end of this series, as up to the present time they show the slowest growth of any forms investigated.

E. L. G.

Culture of Lichen-building Ascomycetes without Algæ: By Alfred Moeller, and *Germination of Lichen-spores on Moss-protomena and on Algæ which are not like the Gonidia of the Lichens*: By Gaston Bonnier.

In the Naturwissenschaftliche Rundschau of October 27 both of these articles are reviewed, and the results of the experiments given. The reviewer begins by stating that the so-called Schwendenerish theory, as elucidated by him about 20 years ago, in regard to the double nature of Lichens, for the majority of botanists had passed out of the stage of theory into that of scientific certainty, but that quite recently some few Lichenologists, Stein, Nylander and others, had placed themselves on the opposite side of the question.

The theory can be proven either by synthesis or analysis. The former method has been tried successfully by Rees, Treub and Stahl, and still more recently by Bonnier, that is, the Lichen-thallus has been raised by uniting fungus-hyphæ and certain Algæ forms. By the analytical method it must be proven that the green part of the lichen, the so-called gonidia, are identical

with certain forms of algæ, which Schwendener very successfully accomplished. But as other investigators, Famintzin and Baranetzky, proved that the gonidia of many lichens were able to carry on an independent existence, while entirely disconnected from the hyphæ of the lichens, this fact was not taken as evidence of the truth of Schwendener's theory, even by the discoverers themselves, and it was maintained that these were not algæ but only free lichen-gonidia. The Lichenologists held firm to the idea that it was possible for the gonidia to take their origin from the lichen-hyphæ. In order to break down this idea, there was only one method to be used, (which he calls the second form of the analytic method) that was to cultivate the lichen-building fungus and bring this to a reproductive stage, as has already been done with the algæ. Lichen spores must be sown where no algæ could get an entrance. These spores of lichens are developed in a fruit form which corresponds to that produced by other fungi. Until the experiments of Moeller, however, all attempts to bring the lichen spores to a full development had failed; they would germinate and grow for a short time, and then die without producing fruit. Moeller succeeded in bringing the spore to develop into a lichen thallus, and this to produce spores*. No gonidia were formed in the whole course of development. The lichens thus cultivated were, *Lecanora*, *Lecidea*, *Graphis*, *Calycium* and *Verrucaria*. In the case of *Calycium* several places in the spore sent out little mycelium tubes, out of which was built, in about four weeks time, a thallus 2 centimetres long and over 1 broad. This thallus developed spermatogonia in which were produced spermatia according to the generally received opinion about the various fruit forms of the lichens. These spermatia, however, on being sown on a proper medium, germinated and produced a thallus. From this fact Moeller decided that they are not fertilizing organs, as they have hitherto been regarded, but only another form of conidia, or asexually produced spores. He names them Pycnoconidia. These experiments seem to have taken away the last fragment of support for the theory of a genetic connection between the algæ and fungi of the lichens. It is still desirable

* Untersuchungen aus den botanischen Institut der königl. Akademie Münster i. w., 1887.

that cultivation be carried farther, until, if possible, ascus fruit is produced from the thallus.

Bonnier had noticed that moss protonema was attacked by some kind of fungus, and it occurred to him that the lichen-building fungus might be brought to use another host if the proper alga forms were not to be obtained. He therefore cultivated moss protonema on sterilized sand, in an apparatus arranged so that no germs were allowed to enter from the air. In this way he raised several mosses, *Hypnum cupressiforme*, *Barbula muralis*, *Funaria hygrometrica*, *Mnium hornum*, *Dicranella varia* and *Phascum cuspidatum*. On these developed cultures he then sowed the lichen spores. In other cases he sowed lichen and moss spores at the same time. He was able to follow the growth of these spores, some of them, under the microscope; saw the protonema of the moss seized by the growing lichen spore and gradually invested with it in the same manner as observed in the case of filamentous algæ. These hyphæ, branching and anastomosing, finally built an elegant network about the moss-protonema.

Bonnier then tried to substitute other algæ forms in lichens having only a certain kind. He placed the germinating lichen spores in the presence of the foreign algæ, but in, most cases, failed to produce a thallus. Twice in case of *Parmelia parietina* however, he succeeded. The normal alga of this lichen is *Protococcus viridis* and he obtained lichens with *Protococcus botryoides*, and what is still more conclusive, with an alga of quite different form, namely, *Trentepohlia abietina*, a reddish filamentous alga. E. L. G.

Index to Recent American Botanical Literature.

Acrostichum Hartii, Baker, n. sp.—J. G. Baker. (Journ. Bot., xxvi., 371). Description of a new species from Trinidad, named for the collector, Mr. John Hart.

Andropogon—Notes on.—F. Lamson Scribner. (Bot. Gazette, xiii., 294–296.)

Berberis Fendleri.—Serenio Watson. (Garden and Forest, i., 460, fig. 72.)